International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 10 | Oct - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Navigating congestion: Understanding spatial strategies in Mandai, Pune

Shrutika Bhongare PU_04 Email ID:
Guided by Gauri Paprikar

Faculty Coordinators Dr. Vaidehi Lavand, Ar. Niranjan Garde, SMEF's BRICK School of Architecture, Pune, Maharashtra Semester I - 2025

Abstract

Its Sunday morning on the streets of Mandai. " Kanda 15 rs kilo" " lasun 150 rs kilo" " aho tai, jara pai sambhalun chala . sagdi kothimber kharab karun takli". while walking we reached to the space where movement slows, pathways dissolves & congestion becomes both frustration & a lifeline for a trade.

This images playout to image of people chatting, laughing, conversing but in the congestion. So, this paper presents a case study of Mandai market examining how the proper planned circulation of internal architecture circulation of mandi differs in the outer organically

peripheral market of Mandai, Pune

From the 4 site visits done on different days, supported by interviews with vendors & customers, the study documents the congestion pattern at different times throughout the day also on different days where the congestion is at peak on Sunday between 11:00 am to 1:00 pm, where the space used by the vendors & customers differs by the weather condition. Understanding how the vendors often perceive congestion positively for its role in increasing visibility & trade, while customers experience discomfort, restricted movement & loss of accessibility.

From this study we can understand the spatial strategies followed from the vendors & customers perspective both where we can understand how the spaces are used where the congestion happens. The case of Mandai demonstrates how the traditional market in India

negotiate between planned structure & unplanned periphery.

Keywords: Congestion, Market Flow, Spatial Strategies, Vendors, Customers, Mandai Pune

1. Introduction

Mandai, once a space of open disorganized market till year 1868. At that time Ar. Ducat, the British architect was taking a walk around Pune. There was one thing to know about him that he hated 2 things: bad design & poor hygiene. & That was the condition of Poona at that time, so he decided to build an organized market but with Victorian gothic style & the design was done with Vasudev Bapuji Kanitkar help.

But as the time passed the use of Mandai varied. People started putting their shops in the periphery of the structure in disorganized i.e., organic way. Due to increase in population, needs of people increased which helped who placed their shops outside the structure to do

business in profitable way. Mandai being architecturally planned structure it didn't caused any congestion for user but the periphery being organically developed cause congestion for every user. The overlap of pedestrian & vehicular movement creates intense congestion. The problem is not merely about overcrowding but about the spatial negotiation that occurs when heritage architecture meets the pressure of contemporary urban demand.

Moving through the site revels that the congestion patter is highly at daytime between 11am to 1 pm, also the peak time for congestion follows with Sunday. But on Saturday the market remains close which helps to understand the space without congestion. Also, at the

peak time the inflow of vehicle adds up to congestion. But the vendors generally view congestion as beneficial for their trade as it enhances visibility 7 attract footfall. In contrast customers often perceive it as a source of discomfort, restricted movement & reduced accessibility, this info gathered from the vendors & customers through interview.

While observing themes of informality, encroachment & congestion, few studies closely examine how vendors & customers themselves adapt & develop spatial strategies in such conditions. MANDAI, therefore provides a valuable way to understand congestion not just as an urban problem but as a lived, negotiated practice.

Research Question: How do spatial strategies adapted by vendors & customers around Mandai market shape the experience of congestion as a user??

Fig- 1
Ref : By author
- Congestion in the periphery of Mandai Pune.

1. Navigating congestion:

1. Understanding spatial strategies in Mandai,Pune

2. Literature Review

1. Informality and Encroachment in Markets

- Traditional markets in India often expand beyond their planned structures, shaped by informal practices and community needs. Patel et al. (2021) argue that "street vending is an important activity related to urban areas," highlighting how informal economies form an integral part of city life, rather than a marginal phenomenon. Similarly, Khan and Podder (2023) describe "counter architecture" as the way informal practices reshape urban form, contesting and complementing planned spaces. Their findings resonate with Mandai, where the periphery illustrates an unplanned yet vibrant extension of the historic structure.
- Research on Krishna Rajendra (K.R.) Market in Bangalore reinforces this view, showing that planning cannot ignore the lived realities of vendors and that frameworks for enhancing spatial form must integrate informality rather than displace it (Patel, Furlan, & Grosvald, 2021). These works collectively situate Mandai within a broader discourse of informality, where encroachments are not only spatial challenges but also economic necessities.

2. Congestion and Traffic Flow in Indian Cities

- Literature on traffic congestion in India provides methodological tools to understand peak flows and crowding patterns. Tsuboi (2021) observes that "a particularly challenging issue in developing countries like India, is the collection of traffic data," emphasizing the difficulty of gathering reliable congestion measures in chaotic contexts. Tsuboi and Mizutani (2021) further note that "large traffic volume is not always a case of traffic congestion," pointing to the importance of analyzing localized blockages and bottlenecks rather than relying solely on volume counts.
- These insights are particularly relevant for Mandai, where congestion arises not only from vehicular load but also from the overlap of pedestrian flows, vendor layouts, and weather-driven adjustments. The modified congestion indices developed in transportation studies (Bhunia & Roy, 2021) also offer frameworks that could complement qualitative mapping in future market research.

3. Market Vibrancy: Positive and Negative Roles of Congestion

- While transport studies often frame congestion as a failure of infrastructure, urban studies literature emphasizes its dual role. On the positive side, congestion increases footfall and enhances visibility for vendors, directly translating into higher trade.

Chakraborty and Koley (2018) found that "street vending is an important activity related to urban areas," providing affordable goods and sustaining livelihoods. From the vendor's perspective, therefore, crowd density is not a burden but a precondition for economic survival.

- Conversely, congestion creates discomfort, safety risks, and accessibility challenges for customers. Devika and Nachiar (2022) highlight that "because of the street vendors, some unfavorable effects are also visible, such as lack of formalization and weak management systems, which create problems in urban areas by producing street garbage and gathering crowd on the footpath." This dual framing — congestion as both vibrancy and inconvenience — is central to understanding Mandai's dynamics.

4. Spatial Strategies and Weather Adaptations

- Beyond the binary of positive and negative, literature also explores the spatial strategies vendors employ to adapt. In Bhuj, Gujarat, vendors describe improvisations such as temporary umbrellas and cart covers to cope with heat and monsoon rains: "The cart- umbrella that I use to shade myself and my goods on the cart costs Rs 1,500/- and hardly lasts one summer, which becomes expensive" (Hunnarshala Foundation, n.d.). Such strategies parallel Mandai vendors' seasonal adjustments, where circulation paths shift based on protective coverings.
- At Manek Chowk, Gujarat, spatial strategies unfold temporally: the same square transforms from a produce market in the morning to a food market at night (Neethi, Kamath, & Paul, 2021). This case illustrates how stall layouts and market use change dynamically through time — a pattern also observed at Mandai across weekdays, weekends, and weather conditions. Furthermore, Karmakar (2023) finds that the permeability of street edges influences where vendors cluster, suggesting that the physical built environment strongly conditions spatial strategies.

Fig- 2
Ref : By author
- Shaded pedestrian pathway (Sunday)

Fig- 3
Ref : By author
- Shaded pedestrian pathway (Saturday)

5. Governance and Policy Perspectives

Governance literature emphasizes that vendor management requires participatory and inclusive approaches. Policy commentary from TheCityFix (Abbott & Shah, 2019) recommends repurposing existing urban spaces for vending, such as elevated walkways, rather than evicting vendors. Such inclusive strategies highlight that congestion management in markets is not only a spatial problem but also a governance challenge.

6. Gaps and Relevance to Mandai

While existing studies illuminate the nature of informality, congestion, and spatial adaptation, gaps remain in connecting time-based congestion mapping with user-driven spatial strategies at the micro-scale of historic markets. Transport research tends to operate at citywide scales, while informality studies often remain descriptive without correlating layout shifts to congestion peaks. The Mandai case study addresses this gap by combining field observations, vendor/customer interviews, and temporal mapping to show how congestion is both a challenge and an opportunity in heritage markets. Together, these works show that managing congestion requires balancing formal planning with informal realities and user needs.

3. Methodology

The research adopts to the case study approach focusing on Mandai, Pune periphery market where 4 site visits were conducted one on weekday, one on Saturday (off market day) & 2 on Sunday (peak market day). To capture variation in activity of congestion across time & day.

- Data collection method:

To understand congestion the data collected through photographs, on site observations, sketches, mapping of congestion spots & activity mapping supported by interviews of 10 vendors & 5 customers. The questions asked to the vendors were about how they use the space, weather- based adaption, perception towards congestion & spatial strategies, while the customers were asked about how they experience the space while shopping, their comfort, accessibility & movement strategies.

Map of Maharashtra

Map of Pune

Mandai

Fig – 4

Ref : author , google - location

- Parameters studied:

- Stalls layout in periphery.
- Pedestrians & vehicular flow at different times.
- Time based variations (early morning, late morning, peak hours)
- Weather impact (sunny vs rainy day adaption)
- User perception (positive for vendors, negative for customers)
- Use of light.
- Space management

- Data analysis:

- The observations were mapped trough the difference in congestion throughout the difference in congestion through out the day & at the peak congestion i.e., 11 am to 1 pm on Sundays. The flow of congestion was mapped through diagrams illustrated overlaps between pedestrian &

- vehicular path. Also interview transcript were coded for recurring themes (visibility, discomfort, accessibility). Comparison was noted to distinguish between weekdays, Sunday & Saturday congestion pattern.

- Limitation:

The study was limited till the periphery of Mandai to observe the congestion at the space, also the observation was limited for regular normal Sundays & weekdays as the festival periods may vary the congestion.

Fig- 5
Ref : By author
- Periphery Studied lanes

Fig- 6
Ref : By author
- Periphery Studied lanes

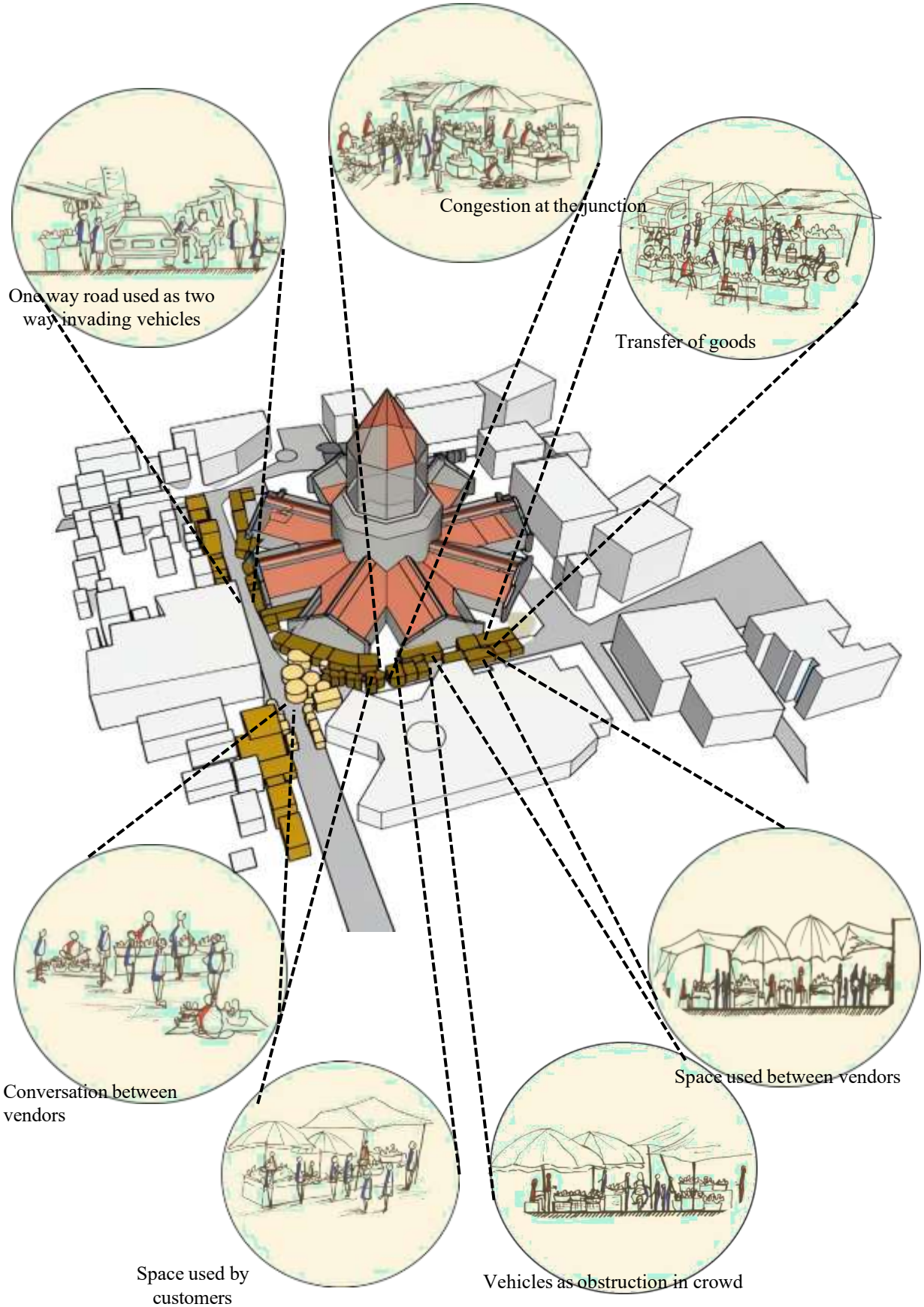

Fig- 7

Ref : By author
- Activity mapping

Case study findings & discussions:

- Congestion pattern-

The observation noted confirms that the peak congestion happens at 11am to 1pm on Sundays followed by vehicular congestion dominating the streets after 1pm. The pedestrian flows are peak at morning timings but reduces gradually as the time flows. Saturdays showed minimal congestion due to partial closure.

- Weather & space use-

Vendors have actively adapted to the layout according to seasonal change. On Sundays temporary umbrellas & cloth covering extend into circulation space, narrowing pedestrian paths. In rainy condition the plastic sheets & tarpuline are used which creates additional obstacles & reduces visibility from customers perspective.

- Vendor's strategies:

Vendors perceive congestion beneficial as higher congestion directly proportional to higher business or profits. Some vendors extend their displays into walkways to maximize contact with customers. This reflects the 'counter architecture' perspective (khan & Podder 2023) where vendors reshape planned circulation for economic advantage. Also, the vendors placement of the shops is planned in such a way that high congestion shops are placed alternately to adjust the congestion.

- Customer's experience:

In constant reported discomfort towards the space & restricted mobility especially during peak hors interviews reveled the customers experience significant challenges during peak hours to navigate from stalls to vehicles also while shopping. as Devika & Nachiar (2022) note, a weak management system amplifies the negative impact of street vending producing crowded & less accessible environments.

- Informal spatial movements:

Despite the congestion, informal regulation emerged. Vendors are putting their displays informally blocking the customers pedestrian in the form of right to way. Also, vendors co-operated by leaving small pedestrian gaps while customers intrusively create desire lines through the crowd. Them resembles Manek Chowk's time-based transformation, where spatial strategies evolve throughout the day (Neethi, Kamath & Paul 2021)

This finding has brought out both challenges & opportunity, where the congestion is inconvenient for customers & also sustains vendors livelihood & market vibrancy. The Mandai case highlights the duality emphasized in studies of street vending (Chakraborty & Koley

.

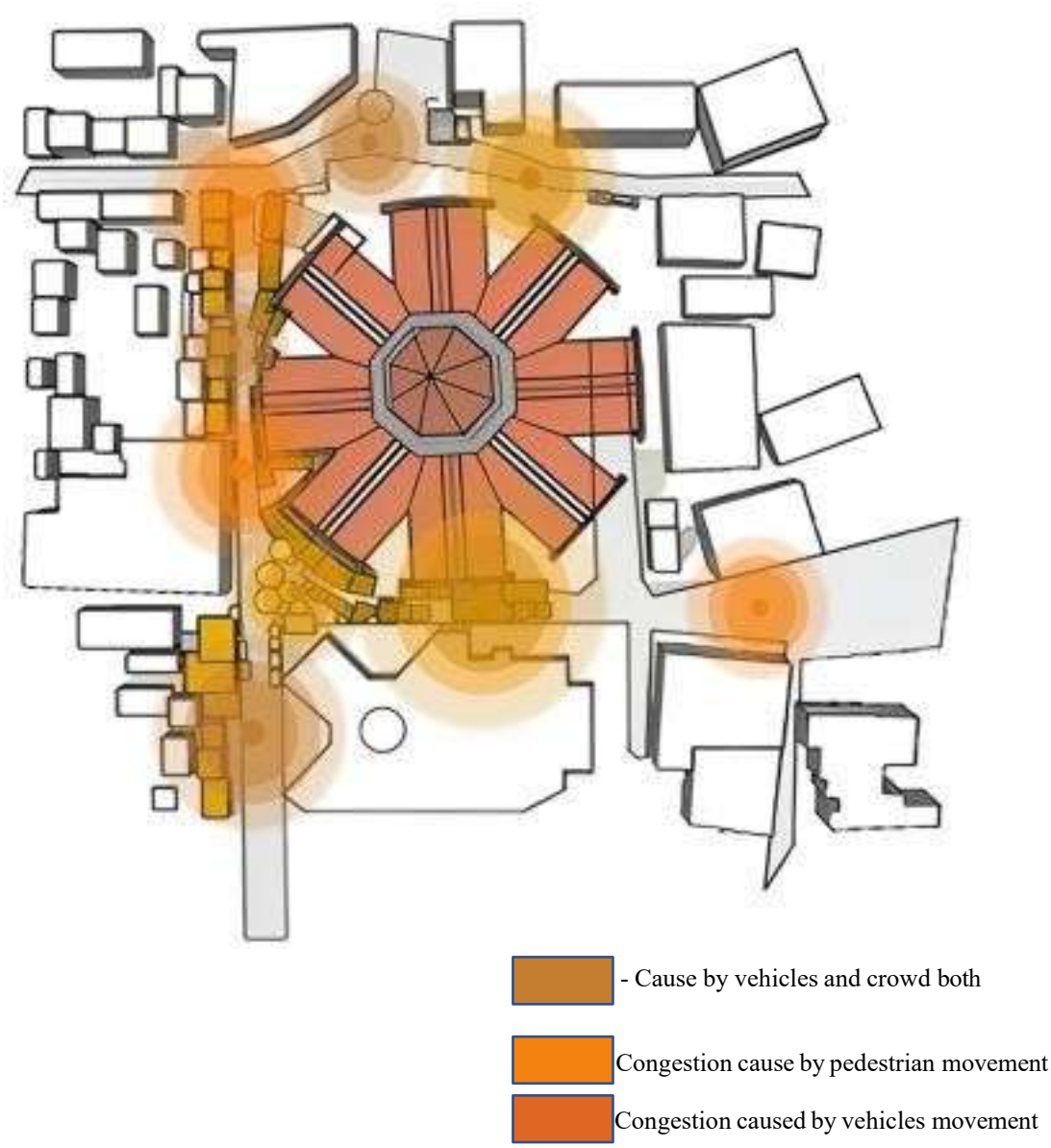

Fig- 8
Ref : By author
- Highlighting different congestion point

4. Conclusions

- The congestion happening in Mandai is time & day dependent where peak time is on Sunday between 11 am to 1 pm
- Congestion perceived by vendors is positive while by customers its negative
- Weather condition slightly influence stall layout & circulation spaces for the user.
- The informal strategies made by vendors such as negotiated gaps & adaptive layout help manage movement despite overcrowding.
- Dual role of congestion;

Congestion is not supposed to be understood solely as a failure of planning. For vendors, it sustains economic vitality for customers, it reduces comfort & accessibility. Mandai demonstrates that congestion is simultaneously a problem & resource.

- Mandai is a case that demonstrates that congestion in heritage market cannot be solved but light touch, context specific intervention the respect informal economics can balance vibrancy & accessibility.
- Congestion cannot only be seen as a problem but as an opportunity for innovative urban design.
- Here there is a call for respectful light touch intervention that perceive vibrancy while improving comfort.

References

- Abbott, T., & Shah, S. (2019). Making space for street vendors: Towards equitable urban development. TheCityFix. Retrieved from https://thecityfix.com/blog/space- street-vendors-equitable-urban-development-participatory-planning-informal-economy- thomas-abbot-sonal-shah/

- Chakraborty, P., & Koley, S. (2018). Socio-economic view on street vendors: A study of a daily market at Jamshedpur. Journal of Advanced Research in Humanities and Social Science, 5(1). Retrieved from https://science.adrpublications.in/index.php/Journal-Humanities- SocialScience/article/view/651/0

- Devika, V., & Nachiar, B. K. (2022). A study on problems and solutions of street vendors. Think India Journal. Retrieved from https://thinkindiaquarterly.org/index.php/think-india/article/view/18213

- Hunnarshala Foundation. (n.d.). Climate resilience for urban street vendors. Earth Exponential. Retrieved from https://earthexponential.org/project/climate-resilience-for- urban-street-vendors/

- Karmakar, P. (2023). Recommendations for spatial planning norms of street vending plan (Master's thesis). School of Planning & Architecture, Bhopal. Retrieved from https://dspace.spab.ac.in/handle/123456789/2146

- Khan, M. R., & Podder, A. K. (2023). Urban planning approach and production of counter architecture: A case study of New Market, Khulna. Journal of Regional and City Planning, 34(3), 303–321. https://doi.org/10.5614/jpwk.2023.34.3.5

- Neethi, N., Kamath, A., & Paul, A. (2021). Everyday place making through social capital among street vendors at Manek Chowk, Gujarat, India. SAGE Open. https://journals.sagepub.com/eprint/KxyjU5HGyhiRXh68vQvE/full

- Patel, S., Furlan, R., & Grosvald, M. (2021). A framework for enhancing the spatial urban form of informal economies in India: The case of Krishna Rajendra Market, Bangalore. SAGE Open, 11(2), 1–17. https://doi.org/10.1177/21582440211023184

- Tsuboi, T. (2021). Visualization and analysis of traffic flow and congestion in India. Infrastructures, 6(3), 38. https://doi.org/10.3390/infrastructures6030038

- Tsuboi, T., & Mizutani, T. (2021). Traffic congestion "gap" analysis in India. In Proceedings of the 7th International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS) (pp. 481–487). https://doi.org/10.5220/0010444604810487

Fig- 9
Ref : By author